REMARKS

Reconsideration of the application is requested in view of the amendments to the claims and the following remarks.

The claims are claims 1 to 6, the only claims presented.

With respect to the listing of references in the specification, it should be noted that Applicants submitted with the application the German and International Search reports and the cited art. The references cited in the application were cited to show the state of the art when the invention was made.

Applicants are submitting herewith amended drawings as required by the Examiner.

Claims 1 to 6 were rejected under 35 USC 112, second paragraph as being indefinite in the term "thin-walled" and term "such as". Also objected to was the use plural "rings" and "needles" and "hardenable".

Applicants traverse these rejections as the amended claims are believed to be definite. The singular form is now used and the claims are specifically directed to needle bearings. The "fully hardened" in line 8 conforms to the fully hardenable wall referred to in lines 5 and 6 which refers to the steel before being hardened and is believed understood by one skilled in the

In the field of needle roller bearings the name **INA** is closely linked with modern development and today's advanced technology. It stands for a comprehensive programme of needle roller and roller bearings designed for maximum space saving.

This catalogue includes extensions of existing series and some important newly developed series.

The load ratings are calculated to ISO recommendations or to DIN, having consideration for our latest experience. Load ratings calculated to other methods should not therefore be compared directly with the values given in this catalogue.

The Technical Appendix deals with the major aspects of bearing selection and application.

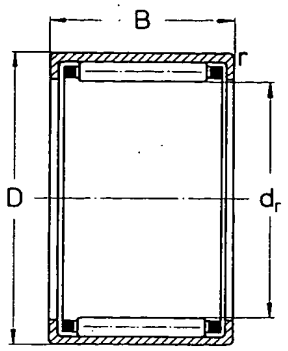
Due to our policy of continuous bearing development we reserve the right to introduce alterations at any time.

Qualified engineers and specialists are available to advise on your applications through the worldwide **INA** organisation.

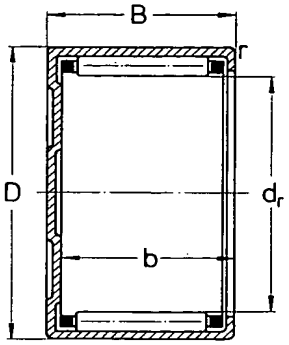
August 1975

Industriewerk Schaeffler
INA-Nadellager

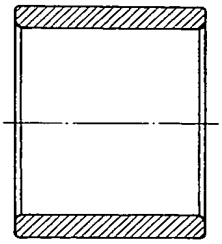
Sealed drawn cup needle roller bearings: pages 62, 63.
Drawn cup needle roller bearings in inch sizes: please ask for catalogue.



HK



BK



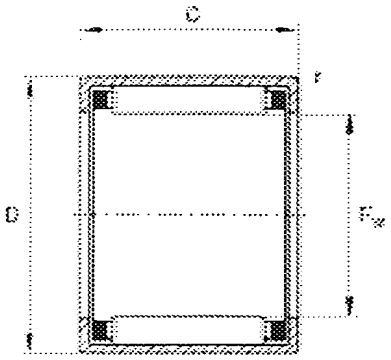
Inner rings to be ordered separately, see page 56, paragraph 2

b mm	r mm	Basic load ratings dyn. C kp	stat. C_o kp	Max. speed $n_{oil} \approx$ rev/min [1]	Suitable inner rings [2] design LR [3]	IR [3] (DIN 620)
5,2	0,8	109	61	50000		
6,4	0,8	154	87	45000		
7,4	1	213	129	40000		
–	1	180	103	37000		
7,4	1	255	162	37000		
7,4	1	275	178	34000		
6,4	1	244	154	30000		
8,4	1	335	234	30000		**IR 5 x 8 x 12**
8,4	1	375	275	27000		
10,4	1	470	365	27000		**IR 6 x 9 x 12**
8,4	1	390	290	24000	**LR 7 x 10 x 10,5**	**IR 7 x 10 x 10,5**
10,4	1	490	390	24000		**IR 7 x 10 x 12**
13,4	1	600	500	24000		**IR 7 x 10 x 16**
8,4	1	440	350	20000	**LR 8 x 12 x 10,5**	**IR 8 x 12 x 10,5**
9,3	1,5	580	425	20000	**LR 8 x 12 x 12,5**	**IR 8 x 12 x 12,5**
9,3	1,5	600	455	18000	**LR 10 x 13 x 12,5**	**IR 10 x 13 x 12,5**
9,3	1,5	630	485	17000		**IR 10 x 14 x 13**
9,3	1,5	690	550	16000	**LR 12 x 15 x 12,5**	**IR 12 x 15 x 12,5**
13,3	1,5	930	820	16000	**LR 12 x 15 x 16,5**	**IR 12 x 15 x 16,5**
19,3	1,5	1180	1110	16000	**LR 12 x 15 x 22,5**	**IR 12 x 15 x 22,5**
9,3	1,5	680	550	15000		**IR 12 x 16 x 13**
13,3	1,5	970	860	15000		**IR 12 x 16 x 16**
19,3	1,5	1160	1090	15000		**IR 12 x 16 x 22**
9,3	1,5	700	580	14000		
9,3	1,5	720	610	13000	**LR 15 x 18 x 12,5**	
13,3	1,5	1030	960	13000	**LR 15 x 18 x 16,5**	**IR 15 x 18 x 16,5**
–	1,5	570	455	12000		
9,3	1,5	760	670	12000		**IR 15 x 20 x 13**
13,3	1,5	1130	1100	12000	**LR 17 x 20 x 16,5**	**IR 17 x 20 x 16,5**
17,3	1,5	1390	1440	12000	**LR 17 x 20 x 20,5**	**IR 17 x 20 x 20,5**
27,3	1,5	1940	2210	12000	**LR 17 x 20 x 30,5**	**IR 17 x 20 x 30,5**

[1]) With grease lubrication ⅔ of the values given in the tables are permissible.
[2]) For wider inner rings refer to page 83.
[3]) See page 56, paragraph 2.

INA Drawn cup needle roller bearings with open ends HK 0912

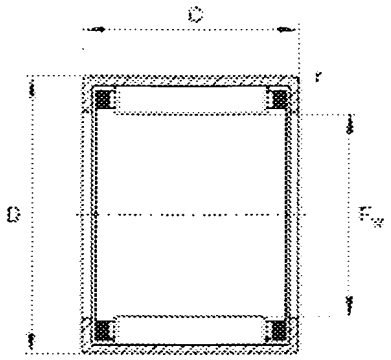
to DIN 618-1/ISO 3245



F_w	9	mm	
D	13	mm	
C	12	mm	Tolerance: -0,3
r_{min}	0,4	mm	
m	4,6	g	Mass
C_r	5300	N	Basic dynamic load rating, radial
C_{0r}	6300	N	Basic static load rating, radial
C_u	810	N	Fatigue limit load, radial
n_G	25000	1/min	Limiting speed
n_B	23000	1/min	Reference speed
	IR 6x9x12		Suitable inner ring For wider inner rings, see series IR

INA Drawn cup needle roller bearings with open ends HK 1712

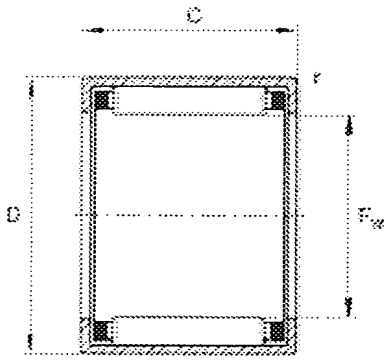
to DIN 618-1/ISO 3245



F_w	17	mm	
D	23	mm	
C	12	mm	Tolerance: -0,3
r_{min}	0,8	mm	
m	12	g	Mass
C_r	7900	N	Basic dynamic load rating, radial
C_{0r}	10300	N	Basic static load rating, radial
C_u	1200	N	Fatigue limit load, radial
n_G	14000	1/min	Limiting speed
n_B	13000	1/min	Reference speed

INA Drawn cup needle roller bearings with open ends HK 3020

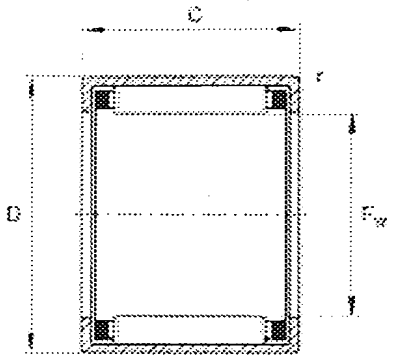
to DIN 618-1/ISO 3245



F_w	30 mm	
D	37 mm	
C	20 mm	Tolerance: -0,3
r_{min}	0,8 mm	
m	39 g	Mass
C_r	22000 N	Basic dynamic load rating, radial
C_{0r}	39500 N	Basic static load rating, radial
C_u	4700 N	Fatigue limit load, radial
n_G	8500 1/min	Limiting speed
n_B	7500 1/min	Reference speed
	LR 25x30x20,5	Suitable inner ring, series LR
	IR 25x30x20,5	Suitable inner ring For wider inner rings, see series IR

INA Drawn cup needle roller bearings with open ends HK 5020

to DIN 618-1/ISO 3245



F_w	50	mm	
D	58	mm	
C	20	mm	Tolerance: -0,3
r_{min}	0,8	mm	
m	70	g	Mass
C_r	31000	N	Basic dynamic load rating, radial
C_{0r}	63000	N	Basic static load rating, radial
C_u	7600	N	Fatigue limit load, radial
n_G	5000	1/min	Limiting speed
n_B	4700	1/min	Reference speed
	LR 45x50x20,5		Suitable inner ring, series LR

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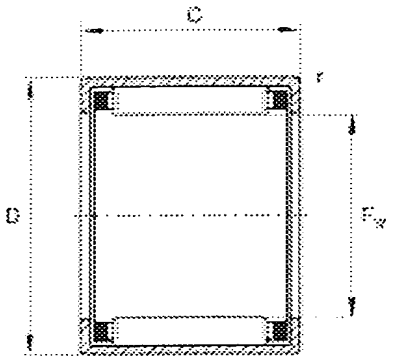
Marie-Louise Pinset

Marie-Louise Pinset

INA Drawn cup needle roller bearings with open ends HK 0408

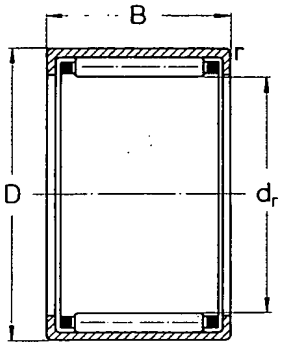
to DIN 618-1/ISO 3245



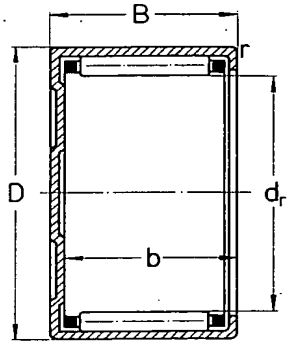
F_w	4	mm	
D	8	mm	
C	8	mm	Tolerance: -0,3
r_{min}	0,3	mm	
m	2	g	Mass
C_r	1780	N	Basic dynamic load rating, radial
C_{0r}	1310	N	Basic static load rating, radial
C_u	146	N	Fatigue limit load, radial
n_G	41000	1/min	Limiting speed
n_B	50000	1/min	Reference speed

not available with lubrication hole.

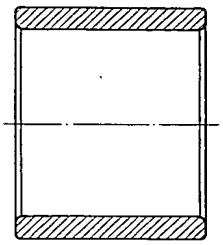
Sealed drawn cup needle roller bearings: pages 62, 63.
Drawn cup needle roller bearings in inch sizes: please ask for catalogue.



HK



BK



Inner rings to be ordered separately, see page 56, paragraph 2

b	r	Basic load ratings dyn. C	stat. C_o	Max. speed $n_{oil} \approx$	Suitable inner rings [2] design	
mm	mm	kp	kp	rev/min [1]	LR [3]	IR [3] (DIN 620)
9,3	1,5	800	730	11000		**IR 17 x 22 x 13**
13,3	1,5	1190	1200	11000		**IR 17 x 22 x 16**
17,3	1,5	1460	1570	11000		**IR 17 x 22 x 23**
–	1,5	520	410	11000		
–	2	1450	1360	11000		
–	1,5	540	445	10000		
9,3	1,5	970	830	9500	**LR 20 x 25 x 12,5**	
13,3	1,5	1390	1320	9500	**LR 20 x 25 x 16,5**	**IR 20 x 25 x 17**
17,3	1,5	1770	1800	9500	**LR 20 x 25 x 20,5**	**IR 20 x 25 x 20,5**
23,3	1,5	2260	2470	9500	**LR 20 x 25 x 26,5**	**IR 20 x 25 x 26,5**
35,3	1,5	3050	3600	9500	**LR 20 x 25 x 38,5**	**IR 20 x 25 x 38,5**
13,3	1,5	1450	1440	8500		**IR 22 x 28 x 17**
17,3	1,5	1850	1970	8500	**LR 22 x 28 x 20,5**	**IR 22 x 28 x 20,5**
9,3	1,5	1070	990	8000	**LR 25 x 30 x 12,5**	
13,3	1,5	1530	1560	8000	**LR 25 x 30 x 16,5**	**IR 25 x 30 x 17**
17,3	1,5	1950	2130	8000	**LR 25 x 30 x 20,5**	**IR 25 x 30 x 20,5**
23,3	1,5	2480	2900	8000	**LR 25 x 30 x 26,5**	**IR 25 x 30 x 26,5**
35,3	1,5	3350	4250	8000	**LR 25 x 30 x 38,5**	**IR 25 x 30 x 38,5**
–	1,5	2450	2900	7500		
9,3	1,5	1160	1140	7000	**LR 30 x 35 x 12,5**	
13,3	1,5	1650	1800	7000	**LR 30 x 35 x 16,5**	**IR 30 x 35 x 17**
17,3	1,5	2110	2460	7000	**LR 30 x 35 x 20,5**	**IR 30 x 35 x 20,5**
9,3	1,5	1240	1290	6000	**LR 35 x 40 x 12,5**	
13,3	1,5	1770	2040	6000	**LR 35 x 40 x 16,5**	
17,3	1,5	2260	2800	6000	**LR 35 x 40 x 20,5**	**IR 35 x 40 x 20,5**
13,3	1,5	1880	2280	5500	**LR 40 x 45 x 16,5**	
17,3	1,5	2400	3100	5500	**LR 40 x 45 x 20,5**	**IR 40 x 45 x 20,5**
17,3	1,5	2750	3350	4800		
22,3	1,5	3400	4450	4800	**LR 45 x 50 x 25,5**	**IR 45 x 50 x 25,5**
–	1,5	1640	1960	4800		
17,3	1,5	2800	3550	4400		**IR 50 x 55 x 20**
25,3	1,5	3700	5100	4400		
9,3	1,5	1540	1690	4000		
17,3	1,5	2950	3950	4000		
29,3	1,5	4700	7100	4000		

[1]) With grease lubrication ⅔ of the values given in the tables are permissible.
[2]) For wider inner rings refer to page 83.
[3]) See page 56, paragraph 2.

Drawn Cup Needle Roller Bearings with Open Ends

Series HK

Drawn Cup Needle Roller Bearings with Closed End

Series BK

$$L = \left(\frac{C}{P}\right)^{\frac{10}{3}}$$

Shaft diameter mm	Designation HK	special sizes HK, HK..TN	Weight g	Designation BK	Weight g	Dimensions d_r mm	D mm	B mm
22	**HK 2212**		13,1	**BK 2212**	15,2	22	28	12
	HK 2216		20,9	**BK 2216**	24,3	22	28	16
	HK 2220		26,2	**BK 2220**	29,9	22	28	20
		HK 22 x 28 x 7,5 TN	8,8	–	–	22	28	7,5
		HK 22 x 30 x 18	30,5	–	–	22	30	18
24	–	HK 24 x 30 x 7,5 TN	10,6	–	–	24	30	7,5
25	**HK 2512**		20,5	**BK 2512**	23,2	25	32	12
	HK 2516		27,3	**BK 2516**	31	25	32	16
	HK 2520		34,1	**BK 2520**	38,7	25	32	20
	HK 2526		44,8	**BK 2526**	49	25	32	26
	°HK 2538		64,7	**°BK 2538**	69	25	32	38
28	**HK 2816**		30,1	**BK 2816**	34,1	28	35	16
	HK 2820		37,6	**BK 2820**	43	28	35	20
30	**HK 3012**		24	**BK 3012**	27,9	30	37	12
	HK 3016		32	**BK 3016**	37,1	30	37	16
	HK 3020		40,1	**BK 3020**	46,5	30	37	20
	HK 3026		52,9	**BK 3026**	59,4	30	37	26
	°HK 3038		76,1	**°BK 3038**	82,5	30	37	38
32	–	HK 32 x 39 x 24	50,7	–	–	32	39	24
35	**HK 3512**		27,7	**BK 3512**	32,9	35	42	12
	HK 3516		36,9	**BK 3516**	43,8	35	42	16
	HK 3520		46,1	**BK 3520**	54,8	35	42	20
40	**HK 4012**		31,1	**BK 4012**	38,2	40	47	12
	HK 4016		41,4	**BK 4016**	51	40	47	16
	HK 4020		51,8	**BK 4020**	63,7	40	47	20
45	**HK 4516**		46,2	**BK 4516**	57,8	45	52	16
	HK 4520		57,8	**BK 4520**	72,3	45	52	20
50	**HK 5020**		72	**BK 5020**	87,3	50	58	20
	HK 5025		90,1	**BK 5025**	109	50	58	25
	–	HK 50 x 57 x 16	51,2	–	–	50	57	16
55	**HK 5520**		78,0	**BK 5520**	93,8	55	63	20
	HK 5528		111	**BK 5528**	132	55	63	28
60	**HK 6012**		49,2	**BK 6012**	68,1	60	68	12
	HK 6020		86,0	**BK 6020**	105	60	68	20
	HK 6032		136	**BK 6032**	164	60	68	32

TN = plastic cage, operating temperatures 120°C max. Only lubricants with a mineral oil base should be used.
° double row with lubrication hole.

Drawn Cup Needle Roller Bearings with Open Ends

Series HK

Drawn Cup Needle Roller Bearings with Closed End

Series BK

$$L = \left(\frac{C}{P}\right)^{\frac{10}{3}}$$

Shaft diameter	Designation		Weight	Designation	Weight	Dimensions		
mm	HK, HK..TN	special sizes HK	g	BK	g	d_r mm	D mm	B mm
3	+HK 0306 TN		0,6	+BK 0306 TN	0,7	3	6,5	6
4	+HK 0408 TN		1,6	+BK 0408 TN	1,8	4	8	8
5	+HK 0509		2	+BK 0509	2,1	5	9	9
6	+HK 0608		2,1	–	–	6	10	8
	+HK 0609		2,2	+BK 0609	2,4	6	10	9
7	HK 0709		2,5	BK 0709	2,7	7	11	9
8	HK 0808		2,7	BK 0808	3	8	12	8
	HK 0810		3,2	BK 0810	3,4	8	12	10
9	HK 0910		3,5	BK 0910	3,9	9	13	10
	HK 0912		4,2	BK 0912	4,5	9	13	12
10	HK 1010		3,8	BK 1010	4,2	10	14	10
	HK 1012		4,5	BK 1012	5	10	14	12
	HK 1015		5,6	BK 1015	6,2	10	14	15
12	HK 1210		4,6	BK 1210	5,2	12	16	10
	HK 1212		9,1	BK 1212	10,3	12	18	12
13	HK 1312		9,9	BK 1312	11,2	13	19	12
14	HK 1412		10,5	BK 1412	12,1	14	20	12
15	HK 1512		11,1	BK 1512	12,7	15	21	12
	HK 1516		15	BK 1516	16,5	15	21	16
	°HK 1522		20,4	°BK 1522	22	15	21	22
16	HK 1612		11,7	BK 1612	13,8	16	22	12
	HK 1616		15,8	BK 1616	17,6	16	22	16
	°HK 1622		21,7	°BK 1622	23,4	16	22	22
17	HK 1712		12,2	BK 1712	14,5	17	23	12
18	HK 1812		13,1	BK 1812	14,9	18	24	12
	HK 1816		17,5	BK 1816	19,9	18	24	16
20	HK 2010		11,8	–	–	20	26	10
	HK 2012		14,1	BK 2012	16,7	20	26	12
	HK 2016		19,3	BK 2016	22,3	20	26	16
	HK 2020		24,1	BK 2020	27,1	20	26	20
	°HK 2030		34,7	°BK 2030	37,4	20	26	30

TN = plastic cage, operating temperatures 120°C max. Only lubricants with a mineral oil base should be used.
+ not available with lubrication hole.
° double row with lubrication hole.

art as would the term "thin-walled" which is equivalent to drawn cup needle bearing as can be seen from the assignee's partial catalog filed herewith. Claim 4 now provides antecedent base and claim 3 now clarifies that it is the fully hardened steel of the outer ring. Claim 6 has been amended to recite that it is the fully hardened steel of claim 4 has the recited composition. Therefore, the amended claims comply with 35 USC 112 and withdrawal of these rejections is requested.

Claims 1 to 6 are rejected under 35 USC 103 as being obvious from the Grell et al patent which the Examiner states discloses a thin-walled needle bearing, produced without removal of material, the outer ring produced from a cold-rolled strip, wherein the outer ring is produced from a cold-formable, fully hardenable steel, and the fully hardened wall having a core hardness of $\geq$ 600 HV and a surface hardness of $\geq$ 680 HV. With respect to the limitation of a ratio of from 1:20 to 1:5 being set between their wall thickness and the diameter of the bearing needles, as this ratio is dependent on the relative size of the rolling elements, this is seen to be a matter of routine design optimization to one of ordinary skill in the art.

Applicants traverse this ground of rejection since one skilled in the art would not be led to needle bearings with the claimed ratio of well thickness and needle bearing diameter.

Applicants agree that Grell is an example of the closest prior art but the rolling bearing of the invention differs from the state of the art shown by the assignees catalog by the claimed ratio between the wall thickness and the diameter of the needle bearing of 1:20 to 1:5 which is not taught by Grell et al. The Examiner's attention is directed to the comparison of the prior art illustrated by Grell et al and the assignee's catalog and the claimed bearings in the application

INA
Catalogue GB-D 303

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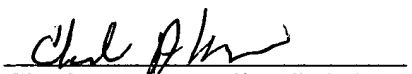
D-8522 Herzogenaurach

as filed. This compares the prior art bearing HK 3020 (lines 23 to 25 of page 8) with the claimed bearing. Other known prior art bearings are HK 0408, HK 0912, HK 1712 and HK 5020, none of which has the claimed ratio of wall thickness to diameter of the bearing. The invention has the advantages pointed out in lines 8 to 20 of page 8 which are in no way taught by Grell et al and makes the inventive needle bearings patentable. Therefore, withdrawal of this rejection is requested.

In view of the amendments to the claims and specification and the above remarks, it is believed that the claims point out the invention. Therefore, favorable reconsideration of the application is requested.

Respectfully submitted,



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Attorney for Applicants
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CAM:mlp
Enclosures